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Evidences of Stream Piracy on the Dakota Hogback Between Golden and Morrison, Colorado

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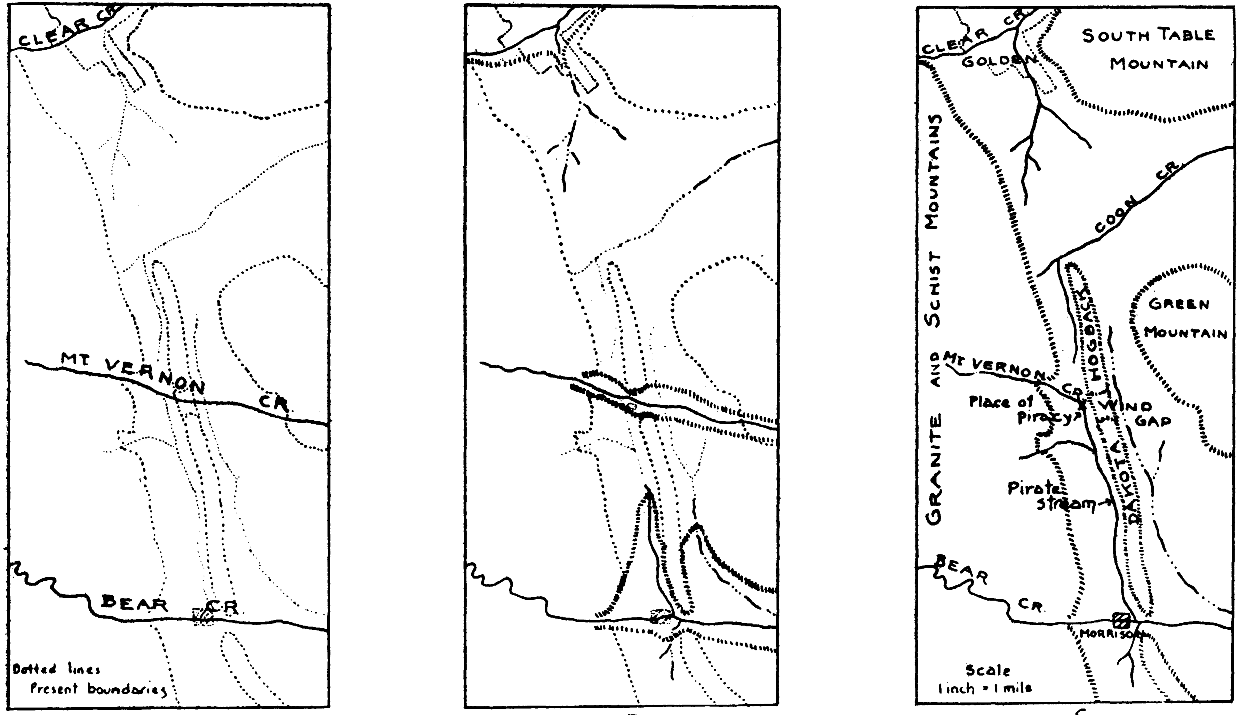
Flanking the pre-Cambrian granite mountains of the Front Range in Colorado are a series of upturned sedimentary rocks—sandstones, shales, and conglomerates ranging in age from Pennsylvanian to early Tertiary. Streams have deeply eroded the region and because of the unequally resistant character of the formations to erosion a system of longitudinal valleys have been developed in the weaker rocks. The uneroded and resistant formations have given rise to the more conspicuous topographic features of the region, namely long and narrow parallel ridges or hogbacks.

Between Golden and Morrison are several hogbacks. Of these, the Dakota hogback is the most prominent one. Its name is derived from the fact that the thick sandstone beds of the Dakota formation cap its summit. This hogback is continuous without a break for the entire distance of four and one-half miles between the two places mentioned. A sag or gap in the otherwise even sky line at a point about four miles south of Golden is the outstanding and noticeable feature of the ridge. The gap is 520 feet long, 435 feet wide, 105 feet deep, and between 300 and 400 feet above the valley floor on either side of the hogback. A study of the gap and its materials brings to light very interesting facts. First: the boulders lying scattered over the even floor of the gap consist of erratic materials, rocks of igneous and metamorphic origin, whereas the gap is cut in sedimentary formations. The boulders consist of various kinds of schist, granite and vein quartz, and range in size from three inches to over two feet. Second: the boulders are subangular to rounded in shape indicating at least some transportation. Third: the boulders are limited to the gap. Fourth: the boulders are far above the reaches of any stream. Fifth: the floor of the gap is practically level and the walls of the gap are well defiined and fairly steep. Sixth: practically no weathered or talus blocks of the sedimentary formations are found in the gap. Seventh: an examination of the rocks of the pre-Cambrian mountains to the west of the hogback reveals rocks similar to those seen in the gap. Eighth: the gap is in a direct line with Mt. Vernon canyon of the mountains to the west, the outlet of the main north tributary of Bear Creek, the master stream of the region.

Conclusion: The only satisfactory explanation that can account for the gap together with the erratic boulders contained in it is that a stream formerly flowed through the gap and deposited the boulders in it. The surface of the region at that time was approximately 400 feet higher than it is now. The abandonment of the gap by the stream was caused by a change in the stream's course due to stream piracy.

PLATE 1



A
ORIGINAL COURSES OF STREAMS

B
DEVELOPMENT OF TRIBUTARIES

C
PRESENT COURSES OF STREAMS

History: After the deposition of the various sedimentary formations uplift occurred resulting in the arching of the sedimentary strata over the floor of the ancient igneous and metamorphic pre-Cambrian rocks. This uplift took place sometime during the Tertiary as early Tertiary sediments are involved in the folding. Streams soon established their courses and followed the easterly slope toward the Great Plains. See A, fig. 1. Because of certain advantages such as greater volume, greater velocity or less resistant formations to work in, Bear Creek gained the advantage over the other streams and became the master stream of the region. As a result, Bear Creek sunk its channel deeper and more quickly through the more resistant formations than did Mt. Vernon creek farther to the north. A north tributary of Bear Creek developed on the softer rocks and extended its valley northward by head erosion. See B, fig. 1. Because this tributary was cutting parallel to the strike in the softer formations and was keeping pace with the master stream it was able to sink its channel more quickly and thus lower its valley more readily than the east flowing Mt. Vernon creek which flowed across the alternating hard and soft upturned edges of the sedimentary formations. As a result the north tributary of Bear Creek captured or tapped the waters of Mt. Vernon creek changing the direction of flow from east to south. The north tributary of Bear Creek thus became the pirate stream and Mt. Vernon creek the captured, diverted and beheaded stream. See C, fig. 1. The changing of the stream's course resulted in the abandonment of the gap and its conversion into a wind gap. Continued erosion lowered the valley floor of the pirate stream until today the stream flows from 300 to 400 feet below the former level of Mt. Vernon creek.